

REMARKS**§103 Rejections**

Claims 111-164 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Frisch (U.S. 5,854,625) in view of Figie (U.S. 5,872,561). Applicant respectfully traverses this rejection.

Claims 111-164 are directed to a force sensor for sensing a touch force applied to a touch surface. As claimed, the force sensor is a separate subcomponent of a touch sensitive device that is defined without reference to other features of the touch sensitive device. The claimed force sensors include "a first capacitor plate at least a portion of which is an elastic element that allows the first capacitor plate to move" (claim 111) or "a first capacitor plate having an elastic element portion" (claim 140). The claimed force sensors also include a second capacitor plate, wherein transmission of at least part of the touch force through the elastic element contributes to a change in capacitance between the first capacitor plate and the second capacitor plate. In other force sensitive touch devices, including those disclosed by Frisch, the force sensors do not include elastic elements that are part of a capacitor plate.

Force sensitive touch devices typically include a touch surface for receiving a touch input, a frame or substrate that supports the touch surface, and some type of sensor typically positioned between the touch surface and the frame or substrate that senses touch forces applied to the touch surface. Some force sensitive touch devices include a spring or other type of biasing member that helps maintain the touch surface in a rest state relative to the frame or substrate and couples the touch surface to the frame or substrate. The sensors measure movement of the touch surface against the biasing forces of the spring.

Frisch discloses a variation of commonly known touch sensitive devices. Frisch discloses a touch sensitive device 10 that includes a frame member 12 that supports a top planar member 14. The planar member 14 is configured with a plurality of slots 16 that define a plurality of spring portions 20 and an outer mounting ring 22 spaced peripherally around a touch surface 18. A plurality of capacitors 24 are disposed at the periphery of the touch surface 18 between the top planar member 14 and the frame member 12. The capacitors 24 include a first member 24a disposed on the bottom of the touch surface 18 and a second plate 24b disposed on or integral with the frame member 12. The capacitors 24 function as the "sensors" of the device 10. When

a touch force is applied to the touch surface portion 18 of the top or planar member 14, the touch surface 18 moves relative to the frame 12. As the touch surface 18 moves, the distance between the capacitive plates 24a, 24b changes thus creating a change in capacitive value that can be measured and used to determine a location of the touch force applied to the touch surface 18.

The capacitors 24 disclosed by Frisch are flat plates (see Figures 1, 2A and 2B of Frisch). The capacitors 24 have no other structure besides the flat plates shown. Further, the plates 24a, 24b are intended to maintain the same size and shape so as to provide a consistent change in the capacitive value with a change in distance between the two plates. Further, it is clear from Frisch that the touch surface 18, being part of the top planar member 14, is a distinct and separate member from the capacitors 24. Thus, it would be improper to interpret any feature of the top planar member 14 as being part of the capacitors 24.

Frisch also discloses spring members 20 that perform those functions described above for springs of commonly known touch sensitive devices. The springs 20 allow the touch surface 18 move relative to the frame 12 while helping retain the touch surface 18 in a predetermined rest state/position. The only member or feature of the device 10 disclosed by Frisch that flexes or has any elastic properties is the spring members 20 and the connection point of those spring members 20 to the mounting ring 22 and the touch surface 18.

The claimed force sensor is a separate member or feature from the touch surface to which the touch force is applied. As noted above, Frisch discloses a touch surface 18 and a sensor type device (capacitor 24) that senses a touch force applied to the touch surface 18. However, Frisch fails to disclose or suggest "a first capacitor plate at least a portion of which is an elastic element that allows the first capacitor plate to move" (claim 111) or "a first capacitor plate having an elastic element portion" (claim 140). The capacitive plates 24a, 24b disclosed by Frisch do not include an elastic element. The spring members 20 disclosed by Frisch are separate and distinct from the capacitive plates 24a, 24b. Therefore, Frisch fails to disclose or suggest every limitation of at least claims 111 and 164.

Figie fails to remedy the deficiencies of Frisch as it relates to claims 111 and 140. Figie discloses a switch matrix 10 that includes an outer membrane 12 and a rearward membrane 16. Each membrane is constructed of a flexible, electrically insulating, transparent material. The insulating properties prohibit the membranes 12, 16 from functioning as a capacitive member. A

plurality of contacts 14 are positioned on a rear surface of the membrane 12, and a plurality of contacts 18 are positioned on a front surface of the membrane 16 directly across from individual contacts 14. The membranes 12, 16 are arranged such that when a finger or stylus presses down upon the membrane 12, the membrane 12 is deformed to cause contact 14 to touch corresponding contact 18. When the contacts 14, 18 engage, a current flows therebetween to provide a switch function. The membranes 12, 16 remain separated by insulating spacers until the membrane 12 is engaged by a stylus/finger. The contacts 14, 18 do not function as a capacitive structure, wherein a change in capacitance of the capacitive structure is monitored as part of a sensor device. The contacts 14, 18 are components of a switch element 26 that operates only upon engagement of the contacts 14, 18 to generate current flow.

The membrane 12 disclosed by Figie is not an elastic element portion of a capacitor plate as the rejection contends. The membrane 12 is a flexible, insulating substrate that supports an electrical contact 14 of a switch element 26. An insulating material is not capacitive. Furthermore, the membrane 12 is a separate and distinct structure from the contacts 14. Therefore, the membrane 12 fails to disclose or suggest "a first capacitor plate at least a portion of which is an elastic element that allows the first capacitor plate to move" (claim 111) or "a first capacitor plate having an elastic element portion" (claim 140). The membrane 12 disclosed by Figie also fails to remedy the deficiencies of Frisch as it relates to the elastic element portion of the capacitor plate recited in claims 111 and 140. Thus, neither Frisch nor Figie, alone or in combination, discloses or suggests every limitation of claims 111 and 140 and the claims that depend from them.

Further to the above, Frisch and Figie fail to disclose or suggest a first substantially planar element of a force sensor wherein "the elastic element portion defining an integral elevated feature of the first capacitor plate, the elastic element portion receiving at least part of the touch force into the first capacitor plate," as required by claim 140. The elastic features disclosed by Frisch and Figie are not part of a capacitive plate and are not an elevated feature of a capacitor plate. Therefore, Frisch and Figie fail to disclose or suggest every limitation of claim 140 for this additional reason.

In view of the above, Applicant requests reconsideration of the application in the form of a Notice of Allowance. If a phone conference would be helpful in resolving any issues related to this matter please contact Applicant's attorney listed below at 651.371.0631.

Fees

- ☒ Please charge any additional fees associated with the prosecution of this application to Deposit Account No. 13-3723. This authorization includes the fee for any necessary extension of time under 37 CFR § 1.136(a). To the extent any such extension should become necessary, it is hereby requested.
- ☒ Please credit any overpayment to the same deposit account.

In view of the above, it is submitted that the application is in condition for allowance. Reconsideration of the application is requested.

Respectfully submitted.

16 April, 2007
Date

By: Robert J. Pechman

Robert J. Pechman, Reg. No.: 45,002
Telephone No.: 651-737-0631

Office of Intellectual Property Counsel
3M Innovative Properties Company
Facsimile No.: 651-736-3833